AMENDMENT
Serial No. 10/774,298
Docket No. VEL03-GN003

REMARKS

Administrative Summary

Claims 1-33 and 48-90 are pending. Claims 48-90 have been withdrawn by the Examiner. Claims 1, 5, and 17 have been amended. Reconsideration of the application is respectfully requested.

August 9, 2007 Office Action

Restriction/Election

The August 9 Office action acknowledges Applicants election of claims 1-33, but summarily concludes that claims 48-90 are withdrawn from further consideration as being drawn to non-elected claims. This conclusion is respectfully incorrect.

Unlike the claims originally subject to the restriction requirement, claims 48-90 have been amended to depend from either claim 1 or claim 17. Claims 1 and 17 obviously fall within the group of claims 1-33. In this manner, Applicants do not understand the Examiner's position as to how these dependent claims, claims 48-90, set forth a patentably distinction invention in comparison to dependent claims 2-16 and 18-33, which apparently do not. In view the Examiner's initial conclusion that claims 2-16 and 18-33 are not patentably distinct from claims 1 and 17, yet claims 48-90 are patentably distinct, Applicants respectfully request the examiner reconsider his restriction requirement. If the restriction requirement is maintained, Applicants respectfully request the Examiner to explain why in his view claims 48-90 are patentably distinct and why claims 2-16 and 18-33 are not.

Rejection under 35 U.S.C. § 102

The Office action first alleges that Applicants' claims, which recite a "system," do not set forth which category of statutory subject matter the invention is directed to. Applicants' recitation of a "system" is well within the statutory categories of subject matter encompassed by the language of 35 U.S.C. § 101; or, at the very least, a "system" is encompassed to the same extent as the Examiner's classification of an "apparatus," which is itself not expressly stated in § 101. In view of the Examiner's determination

that "apparatus" falls within the statutory classes of subject matter enunciated in 35 U.S.C. § 101, it is at least as clear that a "system" does as well.

Claims 1, 2, and 13-15 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 4,167,915 to Toole et al ("Toole"). This ground of rejection has been addressed fully by the amendments made to claim 1. Reconsideration and withdrawal of the 35 U.S.C. § 102 (b) rejection pertaining to claims 1, 2, and 13-15 are respectfully requested.

Claim 1 has been amended to recite a chemical process system comprising: (a) a first unit operation comprising microchannels adapted to be in fluid communication with an inlet stream and an outlet stream for carrying out a continuous process; (b) a pressure vessel at least partially containing the first unit operation therein, the pressure vessel concurrently adapted to be occupied by an inert medium to compress the microchannels of the first unit operation; and (c) a purge stream adapted to be in fluid communication with an inert medium source for selectively conveying the inert medium from the inert medium source and into fluid communication with the first unit operation; where at least a portion of the microchannels are isolated from an interior of the pressure vessel. In this claim, the limitation "at least a portion of the microchannels are isolated from an interior of the pressure vessel," means that at least a portion of the microchannels are not in fluid communication with the interior of the pressure vessel.

Claim 1, as amended, is clearly distinguishable from Toole. For example, Toole fails to disclose a first unit operation comprising microchannels. In addition, Toole fails to disclose a unit operation for carrying out a continuous process. The process of Toole is a batch process that requires opening the housing and vessel to insert and withdraw the silicon wafers. Similarly, Toole fails to disclose microchannels that are isolated from the interior of the pressure vessel. For each of these reasons, as well as these reasons in toto, claim 1 is patentably distinct from Toole and in condition for allowance. Likewise, claims 2-16 and 48-66 that depend from claim 1 are also patentably distinct from Toole and in condition for allowance at least for the same reasons recited above for claim 1. Reconsideration and withdrawal of the 35 U.S.C. §102(b) rejections as to claims 1, 2, and 13-15 over Toole are respectfully requested.

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Rejections under 35 U.S.C. § 103

Claims 1-8 and 10-32 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious in view of U.S. Patent No. 6,192,596 to Bennett et al. ("Bennett"), in combination with U.S. Patent No. 4,167,915 to Toole et al ("Toole"), in combination with U.S. Patent No. 6,136,171 to Frazier et al ("Frazier"), and in combination with U.S. Patent No. 4,253,417 to Valentijn ("Valentijn"). This ground of rejection is respectfully traversed as one skilled in the art would not be motivated to combine Bennett with Toole and with Frazier, and further with Valentijn and, even if so combined, the resulting combination fails to render obvious each and every one of claims 1-8 and 10-32.

The Office action begins its discussion of the obviousness grounds of rejection by correctly setting forth the four factual inquiries recited in *Graham v. John Deere Co.*[1] However, the Office action fails to substantively discuss the final two of these factors, namely: (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. The absence of formal findings for these two *Graham* factors results in an examination analysis that is defective and inhibits Applicants from refuting the conclusions of the Office action that are premised upon assumed facts. Applicants respectfully request the Examiner to clarify exactly who "one skilled in the art" is for purposes of examination.

First addressed by the instant Office action is the scope and content of the prior. The Office action alleges that Bennett discloses a first unit operation with microchannels containing a chemical reactor in fluid communication with an inlet stream and an outlet stream. But the Office action, in addressing the differences between Applicants' claims and the prior art, concedes that Bennett does not disclose a pressure vessel or a first unit operation within a pressure vessel. In addition, the Office action concedes that Bennett does not disclose supplying an inert medium to surround a unit operation. With these differences between Applicants' claims and the disclosure of Bennett acknowledged, the Office action turns to Toole to allegedly disclose those aspects not taught by Bennett.

Toole, as alleged by the Office action, discloses a batch unit operation for oxidizing silicon wafers, where the oxidation chamber is enclosed by a pressure vessel

[1] *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

containing an inert gas such as nitrogen to provide a positive pressure upon the exterior of the oxidation chamber. But Toole makes no mention of microchannels, nor an apparatus amendable to continuous processes. Nevertheless, the Office action summarily concludes without any substantive support that those skilled in the art would combine Bennett and Toole to construct an embodiment reading on Applicants' claims.

To support the combination argument, of Bennett with Toole, the Office action alleges motivation that is neither present in the cited references nor generally available to those skilled in the art. More specifically, those skilled in the art would not be motivated to combine the continuous process structure of Bennett with the batch process structure of Toole. Batch processes are very different from continuous processes. Batch processes, at least as to Toole, require opening both the housing 5 and vessel 11 to insert the silicon wafers, followed by carrying out the process, followed by opening both the housing 5 and vessel 11 to extract the wafers. There is simply no motivation to look to a batch process when confronted with problems of a continuous process. By combining the batch process of Toole with the continuous process of Toole, the resulting combination will necessarily be unfit for either a batch or a continuous process. For this reason alone the alleged combination is impermissible.

In an apparent attempt to fabricate motivation to combine Bennett with Toole, the Office action incorrectly concludes that "[i]t is well known in the art that microchannels can leak reactants out of a microchannel (as evidenced by Frazier (see Example 3) when the microchannels are tested for leaking before operation."[2] But this very conclusion is suspect for a number of reasons. First, nothing in the cited seven lines of Frazier says anything about reactants. Second, Frazier is testing to determine the mechanical integrity of a microchannel device fabricated in accordance with his Example 1.[3] Testing a device, whether it be a microchannel device or otherwise, to determine its breaking point is by no means an acknowledgement that reactants or other constituents flowing through a microchannel *will* leak out. To the contrary, Frazier tested the microchannel device under fluid velocities four times (4X) those expected during normal operation, yet the

[2] August 9. 2007 Office action, p. 6 (referencing U.S. Patent No. 6,136,171 to Frazier).
[3] U.S. Patent No. 6,136,171 to Frazier, Col. 13, ll. 66 and 67.

microchannel device maintained its structural integrity. No reasonable interpretation of Frazier would lead to the conclusion that microchannels necessarily leak or that, even if microchannels leaked, one skilled in the art would want to contain the leak by enclosing the microchannels in a pressure vessel. Undeterred by the lack of objective motivation in Frazier, the Office action goes on to cite U.S. Patent No. 4,253,417 to Valentijn, which is itself lacking in objective motivation to support a combination of Bennett with Toole.

Valentijn is incorrectly cited by the Office action for the proposition that "a preferable way of keeping problems associated with leaking reactors to a minimum is keeping the reactor in an inert environment with an external pressure greater than the internal pressure so as to avoid reactants leaking out."[4] But again, the disclosure of the cited reference, in this case Valentijn, is inconsistent with the proposition for which it is cited. Those portions of Valentijn cited in the Office action, column 8 at lines 37-41, explicitly indicate that the internal pressure of the reactor is *higher than* that of the surrounding interior of the pressure vessel so that the reactor contents leak *into* the pressure vessel.[5] Thus, in direct contrast to the conclusions drawn in the Office action regarding Valentijn, the external pressure of the vessel is *less* than the internal pressure of the reactor so the reactants leak out *from* the reactor and into the pressure vessel, presuming a breach in the integrity of the reactor. Nevertheless, nothing in Valentijn provides any basis to combine Bennett with Toole.

First, Valentijn, like Toole, is not analogous art to Applicants' claims. As noted with respect to Toole, Valentijn is also directed to a batch process for oxidizing silicon wafers. In other words, silicon wafers (which are solid discs) are loaded into the reactor, processed within the reactor in a static state, and then unloaded from the reactor. Each time the oxidation process of Valentijn is carried out, the vessel must be opened to allow access to the reactor. Such a batch process is in direct contrast to Applicants' claimed system that is adapted to carry out a continuous process where the product is a fluid or at the very least includes a fluid carrier.

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[4] August 9, 2007 Office action, p. 6 (referencing U.S. Patent No. 4,253,417 to Valentijn, at Col. 8, ll. 37-41).

[5] See U.S. Patent No. 4,253,417, Col. 8, 37-41 ("A small differential, which may be about 0.2 atm as computed from internal pressure *less* external pressure, may be maintained so as to prevent leakage of contaminants *into* the reactor 24.") (emphasis added)

Modification of the batch apparatus of Toole or the batch apparatus of Valentijn to a continuous process apparatus, such as that of Bennett, would result in a structure unsatisfactory for a batch process. "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification."[6] In this case, no reasonable basis has been asserted in the Office action which would explain how the resulting embodiment, so modified, would permit batch oxidation of silicon wafers as taught by Toole and Valentijn. In this manner, the resulting embodiment would be unfit for the intended use as disclosed in Toole and Valentijn, thereby negating any combination of either Toole or Valentijn with Bennett.

As discussed briefly above, Toole is nonanalogous art with respect to Bennett and Applicants' claims. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned."[7] In the case of Toole and Valentijn, neither reference is in Applicants' field of endeavor (i.e., microchannel technology), nor is either Toole or Valentijn reasonably pertinent to the problem of continuous processes that the Applicants' were concerned with. This fact is born out when looking to convert the batch apparatus of Toole and Valentijn into a continuous process apparatus, which is not feasible, and leads to an embodiment inconsistent with the intended usage (in this case, to oxidize silicon wafers) taught by each reference.

The Office action is also devoid of discussing any reasonable expectation of success. It is uncertain how the batch process of Toole would be adapted to the continuous process of Bennett to render an embodiment reading on any of Applicants' claims. Specifically, neither Bennett nor Toole discloses a first unit operation comprising microchannels, where at least a portion of the microchannels are isolated from an interior of the pressure vessel as recited in claims 1 and 17. In addition, it is impossible to have a reasonable expectation of success where the references themselves fail to disclose each

[6] M.P.E.P. § 2143.01, Section V, citing *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984).
[7] M.P.E.P. § 2141.01(a), quoting *In re Oetiker*, 977 F.2d 1443, 1446 (Fed. Cir. 1992).

and every one of the claimed limitations. Because the combination of references fails to disclose all of the claimed limitations, claims 1 and 17 are in condition for allowance. Likewise, claims 2-33 and 48-90 which depend from claim 1 or claim 17 are also in condition for allowance for at least the same reasons as recited for claims 1 and 17. Reconsideration and withdrawal of the 35 U.S.C. §103(a) rejections as to claim 1-8 and 10-32 are respectfully requested.

Claim 9 stands rejected under 35 U.S.C. §103(a) as allegedly being obvious in view of U.S. Patent No. 6,192,596 to Bennett et al. ("Bennett"), in combination with U.S. Patent No. 4,167,915 to Toole et al ("Toole"), and in combination with U.S. Patent Application Publication No. 2002/0170976 to Bergh et al ("Bergh"). This ground of rejection is respectfully traversed as one skilled in the art would not be motivated to combine Bennett with Toole and with Bergh. Even if these references were so combined, the resulting combination fails to render obvious claim 9. Moreover, Toole teaches away from any combination with Bergh.

Applicants' comments with respect to the impermissible combination of Bennett with Toole discussed above are incorporated here with respect to claim 9. Moreover, Bergh does not cure the inappropriate combination of Bennett with Toole. If anything, Bergh shows precisely why the combination of Bennett with Toole is impermissible. If liquid water was used in the embodiment of Toole, there is no accommodation for inhibiting the water from coming into contact with the internal portions of the vessel. Moreover, those skilled in the art would have no reason to use water instead of oxygen gas for purposes of oxidation, particularly where Toole teaches the importance of "clean room" conditions.[8] More importantly, Toole teaches away from using water.[9] For each of these reasons, and those discussed previously as to claim 1, claim 9 stands in condition for allowance. Reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection as to claim 9 are respectfully requested.

[8] See U.S. Patent No. 4,167,915, Col. 3, ll. 24-29.
[9] See U.S. Patent No. 4,167,915, Col. 3, ll. 24-29.

Claim 33 stands rejected under 35 U.S.C. §103(a) as allegedly being obvious in view of U.S. Patent No. 6,192,596 to Bennett et al. ("Bennett"), in combination with U.S. Patent No. 4,167,915 to Toole et al ("Toole"), and in combination with U.S. Patent No. 4,232,179 to Valladares Barrocas et al ("Valladares"). This ground of rejection is respectfully traversed as one skilled in the art would not be motivated to combine Bennett with Toole and with Valladares. But even if these references were so combined, the resulting combination fails to render obvious claim 33.

Applicants' comments with respect to the impermissible combination of Bennett with Toole discussed above are incorporated here with respect to claim 33. Moreover, Valladares does not cure the inappropriate combination of Bennett with Toole. If anything, Valladares confirms that the combination of Bennett with Toole is impermissible. Valladares discloses directing a sensible heat carrying fluid, simultaneously with the feed, into a reactor. In this manner, Valladares is recycling an effluent stream as a heat source to supply heat essential for their reaction. But no basis is recited in the Office action as to why a batch process would be combinable with a continuous process. For this reason alone, claim 33 stands in condition for allowance. Reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection as to claim 33 are respectfully requested.

Conclusion

In light of the foregoing, it is respectfully submitted that claims 1-33 and 48-90, now pending, are patentably distinct from the references cited and are in condition for allowance. Reconsideration and withdrawal of the rejections of record are respectfully requested.

The Commissioner for Patents is hereby authorized to charge any additional fees that may be required by this paper, or to credit any overpayment to Deposit Account 50-3072.

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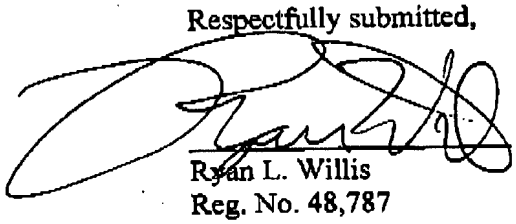
In the event that the Examiner wishes to discuss any aspect of this response, please contact the undersigned at the telephone number indicated below.

Respectfully submitted,



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